

Genetics: The Science of Heredity ▪ *Review and Reinforce***Probability and Heredity****Understanding Main Ideas**

Complete the two Punnett squares below, and then answer the questions on a separate sheet of paper.

1. Punnett Square A:

	<i>B</i>	<i>b</i>
<i>B</i>		
<i>b</i>		

2. Punnett Square B:

	<i>Bb</i>	<i>bb</i>
	<i>Bb</i>	<i>bb</i>

- In the cross between two black guinea pigs shown in Punnett Square A, what is the probability that an offspring will be black? White?
- Is it possible that the cross between two black guinea pigs in Punnett Square A would not produce a white guinea pig? Explain.
- What color are the guinea pig parents in the cross shown in Punnett Square B?
- Which guinea pig parent(s) in Punnett Square B is homozygous? Which is heterozygous? Explain how you know.
- Calculate the probability that an offspring will be black in the cross in Punnett Square B. What is the probability that an offspring will be white?

Building Vocabulary

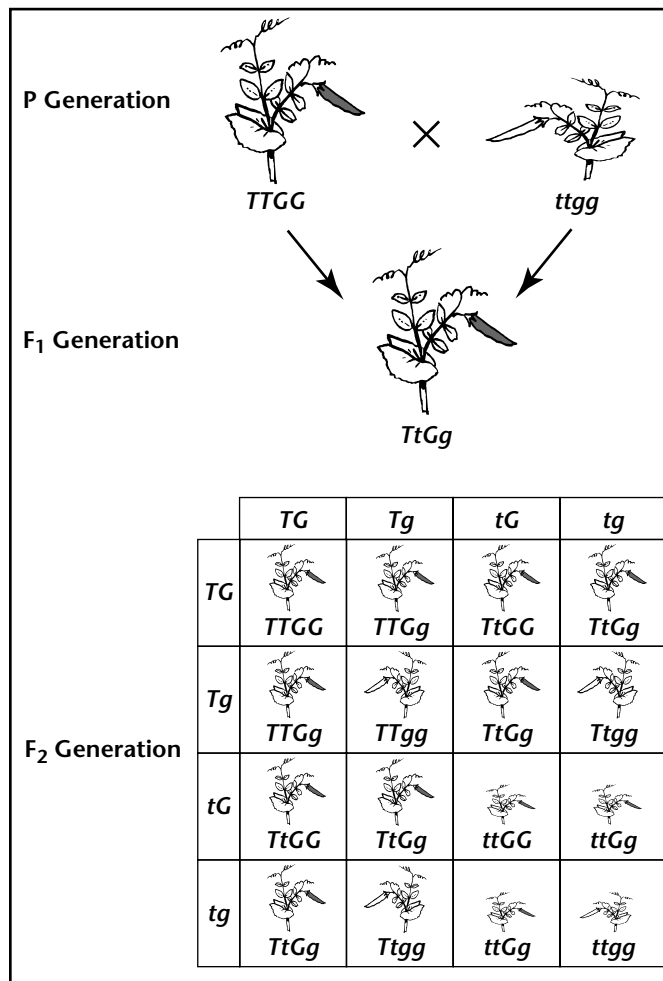
Match each term with its definition by writing the letter of the correct definition on the line beside the term.

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|-------------------------|---|
| _____ 8. heterozygous | a. a chart that shows all the possible combinations of alleles that can result from a genetic cross |
| _____ 9. Punnett square | b. a number that describes how likely it is that an event will occur |
| _____ 10. genotype | c. an organism that has two identical alleles for a trait |
| _____ 11. codominance | d. an organism's physical appearance |
| _____ 12. probability | e. an organism's genetic makeup, or allele combinations |
| _____ 13. homozygous | f. an organism that has two different alleles for a trait |
| _____ 14. phenotype | g. inheritance pattern in which the alleles are neither dominant nor recessive |

Genetics: The Science of Heredity ▪ *Enrich***Genetic Crosses With Two Traits**

In his work with garden peas, Mendel also set up crosses in which he studied the inheritance of two traits at one time. For example, he crossed tall plants having green pods ($TTGG$) with short plants having yellow pods ($ttgg$). The F_1 offspring showed both traits controlled by dominant alleles, tall and green. Mendel allowed the F_1 offspring to self-pollinate. The F_2 offspring had four different phenotypes: tall plants with green pods, tall plants with yellow pods, short plants with green pods, and short plants with yellow pods. These results led Mendel to formulate the Law of Independent Assortment, which states that alleles of one gene separate or assort independently of alleles of another gene. In other words, the distribution of alleles of one gene does not affect the distribution of alleles for another gene.

Study the Punnett square of a genetic cross between two pea plants with two different traits. Then answer the questions that follow.



Answer the following questions on a separate sheet of paper.

1. What are all the possible combinations of alleles that each F_1 parent can pass on to the offspring?
2. What are the possible genotypes of the F_2 offspring? What are the possible phenotypes of the F_2 offspring?
3. What is the probability that an F_2 offspring will be tall with green pods? What is the probability that an F_2 offspring will be short with yellow pods?